Name _____ Period _____ Date _____

Unit 2

Quick Review for counting atom

C.1 SUPPLEMENT: KEEPING TRACK OF ATOMS

Fill-in-the-Blanks

1. A chemical equation is balanced if there are _____ of each kind of _____ on both sides of the equation.

2. Before looking at equations, determine the number of atoms of each kind in each of the following:

   a. $CaCO_3$ = ____Ca, ____C, ____O

   b. $(NH_4)_2SO_4$ = ____N, ____H, ____S, ____O

   c. $3\ H_2$ = ____H

   d. $4\ Mg(OH)_2$ = ____Mg, ____O, ____H

   e. $Ba(NO_3)_2$ = ____Ba, ____N, ____O

3. Now look at the equations. Count the number of atoms of each kind on each side of the following and determine if the statement is a balanced equation.

   a. $2\ Na + 2\ H_2O \longrightarrow 2\ NaOH + H_2$

Reactants		Products
_____	Na	_____
_____	H	_____
_____	O	_____

Balanced? Yes _____ No _____

   b. $4\ NH_3 + 6\ NO \longrightarrow 5\ N_2 + 6\ H_2O$

Reactants		Products
_____	N	_____
_____	H	_____
_____	O	_____

Balanced? Yes _____ No _____

4. For each of the following, show the number of each type of atom on each side of the reaction. Decide if the chemical equation is balanced or not.

   a. $NaCl + F_2 \longrightarrow NaF + Cl_2$

_____	Na	_____
_____	Cl	_____
_____	F	_____

Balanced? Yes _____ No _____

Name _____ Period _____ Date _____

Unit 2

Remember: work L→R
Balance H + O last
treat polyatomics as 1 thing.

C.2 SUPPLEMENT: BALANCING EQUATIONS

Balance the following equations.

1. ____ H_2 + ____ O_2 ⟶ ____ H_2O

2. ____ Mg + ____ O_2 ⟶ ____ MgO

3. ____ Ca + ____ H_2O ⟶ ____ $Ca(OH)_2$ + ____ H_2

4. ____ Cu + ____ $HgNO_3$ ⟶ ____ $Cu(NO_3)_2$ + ____ Hg

5. ____ C_3H_8 + ____ O_2 ⟶ ____ CO_2 + ____ H_2O

6. ____ Al + ____ F_2 ⟶ ____ AlF_3

7. ____ Fe + ____ O_2 ⟶ ____ Fe_2O_3

8. ____ Fe_3O_4 + ____ H_2 ⟶ ____ Fe + ____ H_2O

9. ____ HBr + ____ O_2 ⟶ ____ Br_2 + ____ H_2O

10. ____ Al_2O_3 + ____ HCl ⟶ ____ $AlCl_3$ + ____ H_2O

11. ____ NH_4OH + ____ $FeCl_3$ ⟶ ____ $Fe(OH)_3$ + ____ NH_4Cl

12. ____ NH_3 + ____ O_2 ⟶ ____ NO + ____ H_2O

13. ____ I_2 + ____ HNO_3 ⟶ ____ HIO_3 + ____ NO_2 + ____ H_2O

14. ____ CaO + ____ P_2O_5 ⟶ ____ $Ca_3(PO_4)_2$

15. ____ NaOH + ____ $Al_2(SO_3)_3$ ⟶ ____ Na_2SO_3 + ____ $Al(OH)_3$

BALANCING CHEMICAL EQUATIONS

Name _____

Rewrite and balance the equations below.

1. $N_2 + H_2 \rightarrow NH_3$ _____
2. $KClO_3 \rightarrow KCl + O_2$ _____
3. $NaCl + F_2 \rightarrow NaF + Cl_2$ _____
4. $H_2 + O_2 \rightarrow H_2O$ _____
5. $AgNO_3 + MgCl_2 \rightarrow AgCl + Mg(NO_3)_2$ _____
6. $AlBr_3 + K_2SO_4 \rightarrow KBr + Al_2(SO_4)_3$ _____
7. $CH_4 + O_2 \rightarrow CO_2 + H_2O$ _____
8. $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$ _____
9. $C_8H_{18} + O_2 \rightarrow CO_2 + H_2O$ _____
10. $FeCl_3 + NaOH \rightarrow Fe(OH)_3 + NaCl$ _____
11. $P + O_2 \rightarrow P_2O_5$ _____
12. $Na + H_2O \rightarrow NaOH + H_2$ _____
13. $Ag_2O \rightarrow Ag + O_2$ _____
14. $S_8 + O_2 \rightarrow SO_3$ _____
15. $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$ _____
16. $K + MgBr_2 \rightarrow KBr + Mg$ _____
17. $HCl + CaCO_3 \rightarrow CaCl_2 + H_2O + CO_2$ _____

WORD EQUATIONS

Name _____

Write the word equations below as chemical equations and balance.

1. zinc + lead (II) nitrate yield zinc nitrate + lead

2. aluminum bromide + chlorine yield aluminum chloride + bromine

3. sodium phosphate + calcium chloride yield calcium phosphate + sodium chloride

4. potassium chlorate when heated yields potassium chloride + oxygen gas

5. aluminum + hydrochloric acid yield aluminum chloride + hydrogen gas

6. calcium hydroxide + phosphoric acid yield calcium phosphate + water

7. copper + sulfuric acid yield copper (II) sulfate + water + sulfur dioxide

8. hydrogen + nitrogen monoxide yield water + nitrogen

WORD EQUATIONS NAME:_____

Write the word equations below as chemical equations and balance.

1 sodium chloride and sulfuric acid yield sodium hydrogen sulfate and hydrochloric acid

2 silver nitrate and copper yield copper (II) nitrate and silver

3 hydrogen and nitrogen yield ammonia

4 ammonium nitrate yields nitrogen and hydrogen and oxygen

5 sodium chromate and lead (II) acetate yield sodium acetate and lead (II) chromate

6 ammonia and oxygen yield nitric acid and water

7 magnesium and nitric acid yield magnesium nitrate and hydrogen

8 mercury (I) chloride yields mercury and mercury (II) chloride

9 sodium bicarbonate and sulfuric acid yield sodium sulfate and carbon dioxide and water

10 butane (C_4H_{10}) and oxygen yield carbon dioxide and water

11 carbon dioxide and calcium hydroxide yields calcium carbonate and water

12 carbon monoxide and oxygen yields carbon dioxide

Name _____ Date _____ Class _____

8–2 Practice Problems

1. Write the formula equation for the following reaction: Ammonia reacts with hydrogen chloride to form ammonium chloride.

2. When heated, calcium carbonate ($CaCO_3$) decomposes to form calcium oxide and carbon dioxide. Write an equation for this reaction.

3. Write the formula equation for the following reaction: Barium oxide (BaO) reacts with water to form barium hydroxide.

4. Acetaldehyde (CH_3CHO) decomposes to form methane (CH_4) and carbon monoxide. Write an equation for this reaction.

5. Write the formula equation for the following reaction: Zinc reacts with copper(II) nitrate ($Cu(NO_3)_2$) to form zinc nitrate and copper.

6. When heated, calcium sulfite ($CaSO_3$) decomposes to form calcium oxide and sulfur dioxide. Write an equation for this reaction.

7. Write the formula equation for the following reaction: Iron reacts with sulfuric acid (H_2SO_4) to form iron(II) sulfate ($FeSO_4$) and hydrogen gas.

8. Azomethane ($C_2H_6N_2$) decomposes to form ethane (C_2H_6) and nitrogen gas at 297°C. Write an equation for this reaction.

9. Write out the formula equation for the following reaction: Carbon monoxide reacts with chlorine gas to form phosgene ($COCl_2$).

10. Manganese(II) iodide decomposes when exposed to light to form manganese and iodine. Write an equation for this reaction.

Name _____ Date _____ Class _____

9–2 *Practice Problems (continued)*

11. Write a balanced chemical equation for the reaction in which dinitrogen pentoxide (N_2O_5) reacts with water to produce nitric acid (HNO_3).

12. Magnesium reacts with titanium(IV) chloride ($TiCl_4$) to produce magnesium dichloride ($MgCl_2$) and titanium. Write the balanced equation for this reaction.

13. Write a balanced chemical equation for the reaction in which carbon reacts with zinc oxide to produce zinc and carbon dioxide.

14. Bromine reacts with sodium iodide to form sodium bromide and iodine. Write the balanced equation for this reaction.

15. Write a balanced chemical equation for the reaction in which phosphorus trichloride (PCl_3) reacts with chlorine gas to produce phosphorus pentachloride (PCl_5).

16. Phosphorus reacts with bromine to produce phosphorus tribromide (PBr_3). Write the balanced equation for this reaction.

17. Calcium hydride (CaH_2) reacts with water to produce calcium hydroxide ($Ca(OH)_2$) and hydrogen gas. Write the balanced equation for this reaction.

18. Write a balanced chemical equation for the reaction in which sulfuric acid (H_2SO_4) reacts with potassium hydroxide to produce dipotassium sulfate (K_2SO_4) and water.

19. Write a balanced chemical equation for the reaction in which propane (C_3H_8) reacts with oxygen gas to produce carbon dioxide and water.

20. Benzene (C_6H_6) reacts with oxygen gas to produce carbon dioxide and water. Write the balanced equation for this reaction.

Name _____ Date _____

Chemistry AE

Chapter 8 Review Packet

Use your ion sheet to help you complete the following questions. Remember that on the test, your ion sheet will not include the following ions: phosphate, nitrate, sulfate, hydroxide, ammonium, or carbonate. It will also be missing monatomic ions (ions formed from single elements) which can be determined using a period table. (Group 1 = 1+, Group 2 = 2+, Group 13 = 3+, Group 15 = 3-, Group 16 = 2-, Group 17 = 1-)

Balance the following equations and write the type of reaction.

1. __ Fe_2O_3 + __ H_2O → __ $Fe(OH)_3$ Type:

2. __ VF_5 + __ HI → __ V_2I_{10} + __ HF Type:

3. __ C_6H_{12} + __ O_2 → __CO_2 + __ H_2O Type:

4. __ NaI + __ $Pb(SO_4)_2$ → __ PbI_4 + __ Na_2SO_4 Type:

5. __ Hg_2I_2 + __ O_2 → __ Hg_2O + __ I_2 Type:

6. __ $Fe(OH)_3$ → __ Fe_2O_3 + __ H_2O Type:

7. __ C_4H_{10} + __ O_2 → __CO_2 + __ H_2O Type:

8. __ $KClO_3$ → __KCl + __ O_2 Type:

9. __ Al_2O_3 + __ H_2O → __ $Al(OH)_3$ Type:

Write a balanced equation from the word equation given. Write the type of each reaction.

1. Barium Chloride + Silver Nitrate → Barium Nitrate + Silver Chloride

2. Sodium + Iron (II) Chloride → Iron + Sodium Chloride

3. Magnesium Hydroxide + Sulfuric Acid → Sodium Hydroxide + Water

4. Calcium Carbonate → Calcium Oxide + Carbon Dioxide

5. Pentane (C_5H_{12}) + Oxygen → Carbon Dioxide + Water

6. Aluminum + Iron (II) Nitrate → Aluminum Nitrate + Iron

7. Water + Sulfur Trioxide → Sulfuric Acid

8. C_3H_8 + Oxygen → Carbon Dioxide + Water

9. Sodium Carbonate + Potassium Phosphate → Sodium Phosphate + Potassium Carbonate

10. Lithium Oxide + Water → Lithium Hydroxide

CLASSIFICATION OF CHEMICAL REACTIONS

Name _____

Classify the reactions below as synthesis, decomposition, single replacement (cationic or anionic) or double replacement.

1. $2H_2 + O_2 \rightarrow 2H_2O$ _____

2. $2H_2O \rightarrow 2H_2 + O_2$ _____

3. $Zn + H_2SO_4 \rightarrow ZnSO_4 + H_2$ _____

4. $2CO + O_2 \rightarrow 2CO_2$ _____

5. $2HgO \rightarrow 2Hg + O_2$ _____

6. $2KBr + Cl_2 \rightarrow 2KCl + Br_2$ _____

7. $CaO + H_2O \rightarrow Ca(OH)_2$ _____

8. $AgNO_3 + NaCl \rightarrow AgCl + NaNO_3$ _____

9. $2H_2O_2 \rightarrow 2H_2O + O_2$ _____

10. $Ca(OH)_2 + H_2SO_4 \rightarrow CaSO_4 + 2H_2O$ _____

Word Equations

1. iron (II) chloride + silver oxalate yields iron (II) oxalate + silver chloride

2. mercury (I) sulfate + lithium carbonate yields mercury (I) carbonate + lithium sulfate

3. magnesium metal + copper (II) oxide yields magnesium oxide + copper metal

4. nickel metal + copper (II) chloride yields nickel (III) chloride + copper metal

5. lithium chlorate when heated yields lithium chloride and oxygen gas

6. magnesium chloride + silver perchlorate yields magnesium perchlorate + silver chloride

7. aluminum sulfate + sodium chlorite yields aluminum chlorite + sodium sulfate

8. tin metal + lead (IV) hydroxide yields stannous hydroxide + lead metal

9. sodium metal + lead (II) chloride yields sodium chloride + lead metal

10. iron (III) acetate + beryllium sulfide yields iron (III) sulfide + beryllium acetate